



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

B-10

Work Assignment

[X] Original [] Amendment Number:

Contract Number

EP-C-08-010

Contract Period 12/16/08 - 11/30/09
Base Period

Title of Work Assignment
Lighting Life Cycle Assessment

Contractor
Scientific Consulting Group, Inc.

Specify Section and Paragraph of Contract SOW
Task

Purpose: [X] Work Assignment Initiation [] Work Assignment Close-Out
[] Work Assignment Amendment [] Incremental Funding
[] Work Plan Approval

Periods of Performance

From: Issuance To: 11/30/09

Comments

[] Superfund

Accounting and Appropriations Data

[X] Non-Superfund

DC (Max 6)	Budget Appropriation /EYs Code (Max 6)	Budget Org/Code (Max 6)	Program Element	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1									
2									
3									
4									
5									

Authorized Work Assignment Ceiling

Contract Period: 12/16/08 - 11/30/09

Cost/Fee

LOE

Previously Approved

This Action

340

Total

340

Work Plan / Cost Estimate Approvals

Contractor WP Dated :

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee:

LOE:

Work Assignment Manager Name

Robert A. Clarke

(Signature)

8/25/09

(Date)

Branch/Mail Code ORD/8105R

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Project Officer's Name

Verla Sutton-Busby

(Signature)

9/21/09

(Date)

Branch/Mail Code: ORD/ISS/8102R

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Other Agency Official Name

Gary Foley

(Signature)

8/31/09

(Date)

Branch/Mail Code : 8105R

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FAX Number

Contracting Official Name

Renita Tyus

(Signature)

9/21/09

(Date)

Branch/Mail Code CPOD

Phone Number (513) 487-2094

Fax Number (513) 487-2109

Contractor Acknowledgment of Receipt and Approval of Workplan (Signature and Title)

Date

PERFORMANCE WORK STATEMENT

Contract Number EP-C-08-010

Scientific Consulting Group

Work Assignment Number: B-10

Title:	Lighting Life Cycle Assessment
Scope of Work Reference:	Task: 2.2
Period of Performance:	Date of Issuance through November 30, 2009
Estimated Level of Effort:	340 Hours
Work Assignment COR:	Robin Clarke Office of Science Advisor U.S. EPA (8105-R) Office of the Science Advisor 1200 Pennsylvania Avenue, N.W. Washington, D.C. 20460 Telephone: (202) 564-6493 Fax: (202) 565-2910
Alternate Work Assignment COR:	Neil Stiber Office of Science Advisor U.S. EPA (8105-R) Office of the Science Advisor 1200 Pennsylvania Avenue, N.W. Washington, D.C. 20460 Telephone: (202) 564-1573 Fax: (202) 565-2910
Project Officer:	Verla Sutton-Busby U.S. EPA (8102R) Office of Research and Development 1200 Pennsylvania Avenue, N.W. Washington, D.C. 20460 Telephone: (202) 564-6808 Fax: (202) 565-2910

1. Background

Despite their energy efficiency, compact fluorescent lamps (CFLs) have the significant drawback of increasing the use of mercury and increasing mercury exposure in the home. Some basic life cycle assessments (LCAs) on incandescent bulbs and CFLs have predicted an overall reduction in the amount of mercury released to the environment, however, these analyses focus only on energy use from production and use of CFLs and do not account for breakage, improper disposal, and mercury releases during production. The LCA will clarify a fuller range of environmental impacts, including resources used and waste disposed.

Improved efficiency of incandescent light bulbs is receiving greater research and media attention as the negative aspects of CFLs and their use are gaining more attention. It is unclear how the modest improvements in energy efficiency seen in incandescent bulbs affect their entire life cycle and what level of efficiency would make them preferable to CFLs.

Light emitting LEDs offer the greatest energy efficiency of all the light sources and the greatest potential for durability. However, they are relatively costly and are made from materials that are poorly understood. It is not clear what the broad implications would be from major, wide scale use of LEDs for residential lighting.

The LCA will provide a level comparison of the three lighting types and an analysis that will be useful for determining what policies and pressures are needed to reduce environmental impacts. By identifying the relative risks, benefits, and management options associated with commercial lighting technologies, EPA will better be able to encourage the use of the most environmentally beneficial options.

2. Purpose

The goal of this performance work statement is to provide a screening-level LCA of the two main sources of residential lighting, standard incandescent bulbs and CFLs, as well as an emerging lighting technology, light-emitting diodes (LEDs). The life-cycle assessment for each type of light will include material and energy inputs/outputs associated with extraction and processing of raw materials, production, distribution and transport, use, storage, and disposal or recycling.

A “screening-level” LCA provides a comprehensive description of the steps in the product life-cycle, with as much readily available data as possible for each step plus identification of known data gaps. An objective is to understand the present state of the various lights and their potential environmental issues (from toxicity to environmental fate to water use to waste disposed), including examining the entire system for practical ways to reduce environmental impacts.

The comparative LCA will be useful for EPA decision makers to qualitatively or semi-quantitatively determine relative environmental impacts from standard residential lighting using incandescent bulbs, CFLs and LEDs. The LCA approach makes it possible for programs to make informed decisions based

on a holistic assessment of the technologies rather than on individual aspects (such as energy efficiency).

The mapping of the “flows” of materials and energy for producing, packaging, transporting, using, and disposing will be useful for understanding the effects from the entire system. Each lighting system has issues (known and unknown), and the LCA can also identify opportunities to design those issues out of the system.

The LCA will enable EPA programs to provide sound guidance to the public regarding the types of lighting technology best suited to meeting general use and residential needs with the lowest possible health and environmental costs and consequences.

Despite the issues with mercury releases from CFLs, we expect their continued and increased use for the foreseeable future. Thus, the LCA information on CFLs will also help EPA programs identify options for reducing mercury releases from CFL bulbs at specific points in the CFL life-cycle.

3. Tasks

A) Staffing - In the work plan, the contractor shall identify qualified staff to perform the tasks provided in the work assignment. Staff must be qualified in the subject matter and must be qualified to gather and analyze technical and programmatic information.

Staff must have extensive experience and expert knowledge of life cycle assessment.

B) The contractor shall consider the following and generate a report meeting the objectives stated below, and additional resources as necessary to complete this task.

Expectations:

The product is expected to:

- Include a description of the different types of technologies and a summary of the “state of the technology” including current market penetration estimates, durability, technical issues, and current limitations.
- Consider potential for mercury and other exposures throughout the life cycle of the products accounting for the location of release (e.g., the expected differences in exposure from power plants, breakage in the home, during and after disposal, and during production of the bulbs and procurement of the materials). The source of mercury in CFLs should be identified with a description of the potential for environmental release and worker exposure.
- Identify the relative discharge of significant pollutants to air, water and land from power plants supplying power for the production and use of the types of lighting technology.
- Clearly identify information gaps. For instance missing information regarding human and/or ecological toxicity and exposure, environmental fate, environmental transport data on materials or byproducts should be identified.

- Identify uncertainties in the analysis, including those related to the use of assumptions, the maturity and stability of the technologies, product durability, and human behavior.
- Include the utility of and challenges associated with recycling/reuse programs to reclaim materials in an environmentally beneficial way.
- Identify any significant legislation in effect that encourages (or discourages) the use of any of the technologies. (e.g., EISA 2007).
- Cite and use existing literature and analyses where appropriate when this type of information is available.

4. Deliverables

Work plan due within 15 calendar days of receipt of the work assignment.

Upon issuance of the work assignment the contractor shall consult with the Work Assignment COR, in order to discuss work assignment issues, direction, and progress.

A draft report should be delivered by November 1, 2009. EPA will provide comments to the contractor for inclusion in the report.

A final report, in electronic format (Word), should be provided by November 30, 2009.

5. ACCEPTANCE CRITERIA

Final products shall be produced by the Contractor upon the EPA WA COR's approval through written technical direction. The Contractor shall provide all materials written as part of these tasks to the EPA WA COR, as per work assignment, in electronic format. Electronic versions shall be compatible with current ORD computer systems (Word and Excel) and software.

6. MANAGEMENT CONTROLS:

Periodic meetings between the EPA and contractor work assignment managers are encouraged to discuss any questions that may arise during performance or completion of this work assignment. At the EPA WA COR's discretion, these meetings may occur via teleconference or video conferences. The contractor shall document these meetings and submit copies of this correspondence to the EPA WA COR.

The EPA WA COR may identify one or more EPA technical representatives for this work assignment. Interaction between the contractor and any EPA technical representative(s) designated by the EPA WA COR is solely for the purpose of presenting and discussing the information, analyses, results, or presentations related to this work assignment. The interaction will be technical communication vice technical direction. Per the technical direction clause EPAAR 1552.237-71 of the contract, the EPA PO COR and the EPA WA COR or alternate EPA WA COR are the only representatives of the CO authorized to provide technical direction.

Per the technical direction clause, the CO and PO will be provided with copies of all technical direction.